CLAIMS

What is Claimed is:

1. A device for processing an image comprising:

decompose logic that is operable to decompose an input image into a plurality of composite images that comprise different frequency bands of said input image;

storage coupled to said decompose logic to store a plurality of composite images as reference images for comparison with a later input image;

comparison logic to compare said composite images with said reference images to produce preliminary motion values for said different frequency bands; and

logic to determine a final motion value from said preliminary motion values.

2. The device of Claim 1, wherein:

said decompose logic performs a redundant Discrete Wavelet Transform.

3. The device of Claim 2, wherein said decompose logic performs said redundant Discrete Wavelet Transform to produce images in which an "x" component and a "y" component comprise different frequency bands from each other.

4. The device of Claim 3, wherein said decompose logic performs said redundant Discrete Wavelet Transform to produce images in which

an "x" component and a "y" component comprise the same frequency bands as each other.

5. The device of Claim 2, wherein said decompose logic performs said redundant Discrete Wavelet Transform to produce images in which an "x" component and a "y" component comprise the same frequency bands as each other.

6. The device of Claim 2, wherein said comparison logic compares said preliminary motions values from different bands of said frequency bands to determine differences based on features in the spatial domain.

7. The device of Claim 1, wherein said logic to determine a final motion value modifies preliminary motion values associated with a frequency band of said different frequency bands, wherein repetitive features are reduced.

8. The device of Claim 1, wherein said decompose logic comprises a plurality of filters having different frequency characteristics from each other.

9. The device of Claim 1, wherein said comparison logic performs a cross-correlation on a subset of pixels between said composite images with said reference composite images.

10. The device of Claim 1, wherein said motion values comprise an x-motion value and a y-motion value and said logic to determine a final

motion value weighs said x-motion value differently from said y-motion value.

11. The device of Claim 1, wherein said decompose logic performs a quantization with a pre-determined threshold.

12. An optical navigation system comprising:

an image sensor;

transform logic coupled to the image sensor that is operable to perform a Discrete Wavelet Transform to decompose an input image from said image sensor into a plurality of composite images that comprise different frequency bands of said input image;

storage coupled to said transform logic to store a plurality of composite images as reference images for comparison with a later input image;

comparison logic to compare said composite images with said reference images to produce preliminary motion values for said different frequency bands; and

logic to determine a final motion value from said preliminary motion values.

13. The system of Claim 12, wherein:

said transform logic performs a redundant Discrete Wavelet Transform.

14. The system of Claim 12, wherein said transform logic produces images in which an "x" component and a "y" component comprise

different frequency bands from each other, wherein repetitive features in the x-axis or y-axis of said input image are selectively filtered.

15. The system of Claim 12, wherein said logic to determine a final motion value attenuates preliminary motion values associated with a frequency band of said different frequency bands, wherein repetitive features are reduced.

16. The system of Claim 12, wherein said comparison logic performs a cross-correlation on a subset of pixels between said composite images with said reference composite images.

17. The system of Claim 12, wherein said motion values comprise an x-motion value and a y-motion value and said logic to determine a final motion value weighs said x-motion value differently from said y-motion value.

18. The system of Claim 12, wherein said transform logic performs a quantization with a pre-determined threshold.

19. A method of motion detection using multiple frequency band image processing comprising:

receiving an input image;

decomposing said input image into a plurality of composite images that comprise different frequency bands of said input image;

comparing said composite images with reference composite images to produce preliminary motion values for said different frequency bands; and

determining a final motion value from said preliminary motion values.

20. The method of Claim 19, wherein:

said decomposing step comprises recursively performs a Discrete Wavelet Transform.

21. The method of Claim 20, wherein said decomposing step produces an image comprising "x" component information having a different frequency band from a frequency band of a "y" component of the image.

22. The method of Claim 20, wherein said determining step compares said preliminary motion values from said different frequency bands to determine differences based on features repeating at different regularities in the spatial domain.

23. The method of Claim 19, wherein said determining step modifies preliminary motion values associated with a frequency band of said different frequency bands, wherein repetitive features are reduced.

24. The method of Claim 19, wherein:

said decomposing step filters said input image with a plurality of filters having different frequency characteristics.

25. The method of Claim 19, wherein said comparison step performs a cross-correlation between said composite images with said reference composite images, wherein said cross-correlation is performed on a subset of pixels.

26. The method of Claim 19, wherein said determining step weights said motion values differently to assign greater or less weight to different frequency bands of said frequency bands.

27. The method of Claim 26, wherein said determining step dynamically determines weighting values.

28. The method of Claim 19, wherein said decomposing step performs quantization with a threshold that is pre-determined.

29. The method of Claim 19, wherein said method is performed in an optical mouse.